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Gas-Fired Hot Air Radiators.

Forced Ventilation and Automatic Temperature Regulation.

By H. THURSTON OWENS.

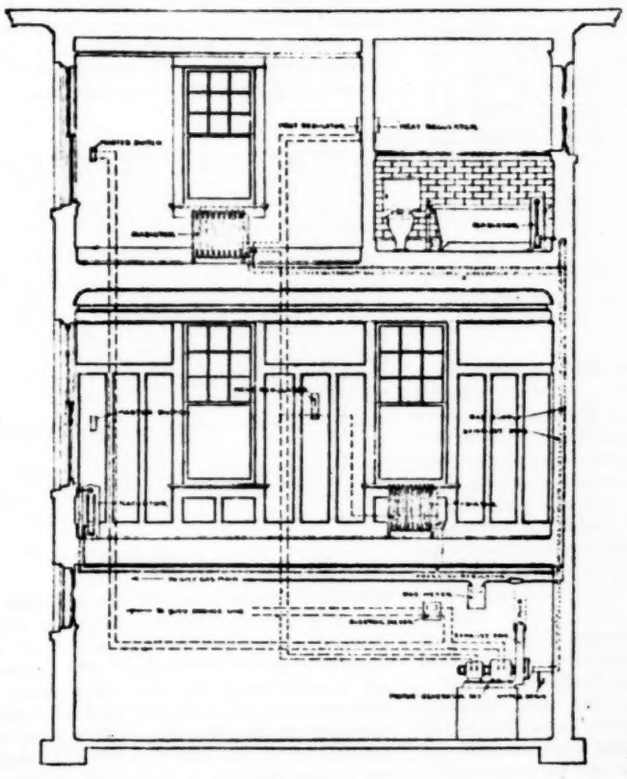
Temperature control has two meanings in heating by means of gas: 1. Regulation of space temperature. 2. Regulation of flame temperature.

In room heating it is always applied to space temperatures, and in industrial appliances to that of the flame.

Room temperature control is a feature of practically all large steam heating installations, and has a definite bearing on the success of a heating outfit; and it appears to add great advantages in the case of gas heating owing to the fact that the heating source is a comparatively expensive product.

To date, such heating is an open field, as installations equipped so as to provide equable room temperature have been in inverse proportion to the possibilities.

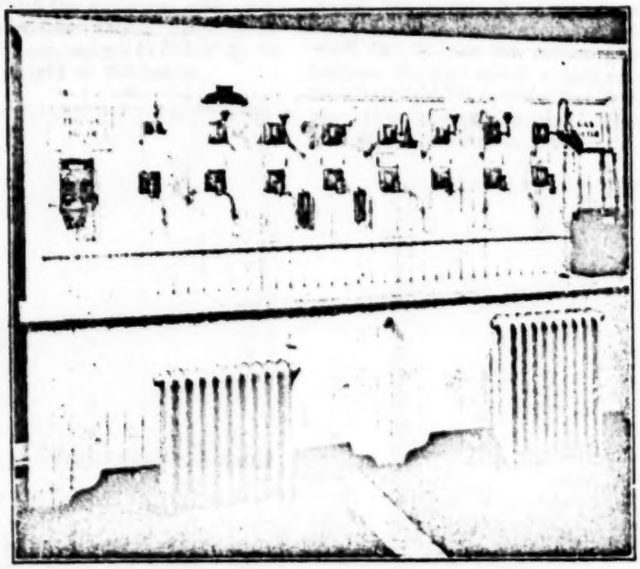
The system described in this article covers both phases of temperature control, as the room temperature is kept at a satisfactory point by means of thermostats, and the flame temperature is affected by a mechanical exhaust. The speed at which the products are exhausted, determine the air supply to the burners, which influences the rate of propagation and hence the flame temperature.



House Heating Installation.

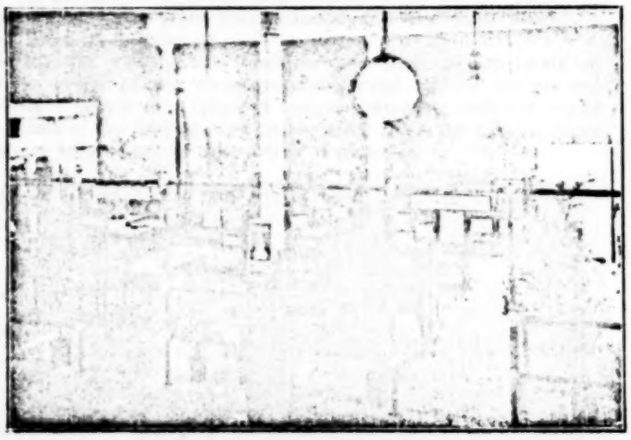
THE AUTOMATIC GAS RADIATOR SYSTEM consists of individual hot air, gas-fired radiators, flue connected, equipped with thermo-

EDITOR'S NOTE: This is the third article of a series by Mr. Owens, showing how gas is used in the equipment of Modern Buildings. See JOURNAL, Jan. 24, 1916, page 50 and Feb. 21, 1916, page 113.



Two Sizes of Radiators: Thermostats on Board.

stats and a power exhaust; as shown in the cross section plan. The radiators are of iron, with pipe line burners and pilot light, and an iron pipe flue for the products of combustion. Combustion takes place inside the radiator, the air supply being drawn in by the exhaust. The flue from each radiator is connected to a main running to the basement, the products of combustion being drawn down and discharged into the chimney flue by means of an electrically driven exhaust fan. Each radiator in addition to the thermostatic control of the main gas valve, is equipped with a magnetic safety valve. These valves are positive and must be energized before they open and admit gas to the main burner. The energy to operate the valves comes from a small dynamo operated by the motor that runs the exhaust fan.



New Orleans Sales' Room Floor.

This arrangement takes care of two possible sources of danger:

1. A radiator cannot become overheated, as the gas will not burn unless the fan is running.
2. If a pilot should be out, the unburnt gas will pass out of the premises through the flue.

When the system is in proper working order the gas supply at each radiator is automatically cut off by the action of the thermostat when the temperature reaches 70, or any other pre-determined point.

It is to be noted that the method of heating described in this article is a complete system of heating, as distinct from the independent units referred to in the previous articles in this series.

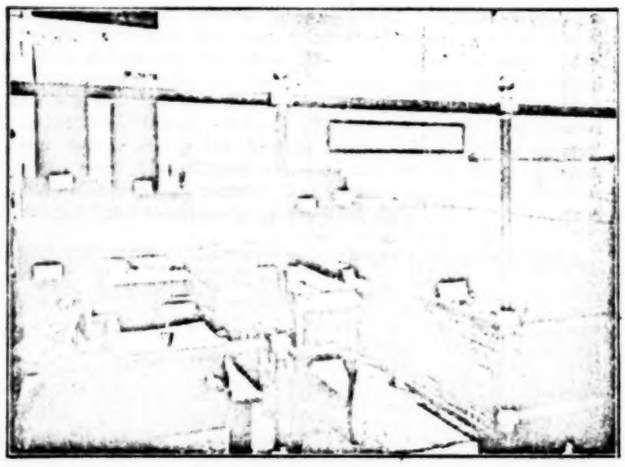
The makers of the apparatus report that they have installed 25 heating systems on this plan the past winter, and all have given satisfactory service.

NEW ORLEANS RAILWAY AND LIGHT COMPANY'S INSTALLATION.

The general appearance of the radiators is shown in the picture of the installation in the show-rooms of the New Orleans Railway and Light Company, where the thermostats are located on the fixture board. They are also installed in the executive offices of the company where their effectiveness can be demonstrated.

With this heating system it is possible to maintain a temperature within 1 if desired, but the thermostats are ordinarily adjusted to maintain a temperature within a range of 2½ .

The economy of the system is brought about by the efficient



New Orleans Industrial Display.

manner in which the gas is burned, producing perfect combustion; and gas being consumed only when it is needed for heating, because when the room has reached a desired temperature the regulator automatically cuts off the gas supply until the temperature drops 2½°, when gas is automatically supplied again and the operation is continued.

The radiators are made either of cast iron or pressed metal.

The New Orleans Company has recently greatly enlarged the work in its commercial department, and the views of the range display and industrial section, do credit to their merchandising spirit.

The writer is indebted to Mr. W. E. Clement, commercial manager of the New Orleans Company; to Mr. S. J. Dill, vice-president of the United Gas and Electric Engineering Corporation, and to the Automatic Gas Radiator Company, for the data and information herein.

Re-Leveling a Gas Holder.

[From paper by A. R. SCHILLER, to the New England Association of Gas Engineers.]

In the latter part of 1914, the Connecticut Power Company was confronted with the problem of re-leveling a 200,000 cubic foot storage holder, which, because of improper foundation, had become so distorted as to jeopardize the future safety of the structure.

The holder is on the west bank of the Thames River, approximately 75 feet from the water's edge, and adjacent to the generator house. It is of the steel tank type, with two lifts, designed and erected by the Bartlett Hayward Company, in 1905. The tank is 75′ in diameter by 20′ 9″ high, the two lifts 70½′ and 70′, respectively, in diameter by 25′ 9″ high. The total weight of the metal is approximately 375,000 pounds, or 188 net tons, and the total weight of the structure, with the tank filled with water, is 7,420,600 pounds, or 3,710 tons. The latter weight, based on the tank diameter of 75 feet, represents a pressure on the foundation of 1,680 pounds per square foot under normal operating conditions.

Preparatory to laying the foundation, about 500 wooden piles of from 18′ to 20′ in length were driven, spaced in the following manner:

Around the outside circumference of the foundation were four concentric rows spaced 18″ on the centers; and in the area included within the innermost of these circles, the remainder of the piles were driven at the apices of equilateral triangles, the sides of which were about three feet. The tops of the piles were driven to approximately the same grade, and a 12″ layer of concrete, topped with a 2″ layer of dry grout, formed upon them. This completed the foundation, and, although at the time of erection it was considered adequate to carry the load, subsequent developments proved it unable to shoulder this task.

Date	9/6/12	9/6/12	9/28/12	10/1/12	10/9/12	10/16/12	10/23/12	11/6/12	11/20/12	12/1/12	12/15/12
NORTH SIDE	0.013	0.010	0.014	0.014	0.014	0.014	0.012	0.014	0.011	0.012	0.014	0.014
EAST SIDE	5.681	5.680	5.685	5.691	5.692	5.692	5.690	5.690	5.690	5.690	5.693	5.680
SOUTH SIDE	0.041	0.025	0.015	0.035	0.024	0.022	0.019	0.021	0.023	0.021	0.022	0.023
WEST SIDE	0.370	0.372	0.380	0.365	0.362	0.362	0.362	0.362	0.362	0.362	0.362	0.362

Date	12/29/12	1/5/13	1/26/13	2/9/13	2/23/13	3/9/13	3/23/13	4/6/13	4/20/13	5/4/13	5/18/13	6/1/13
NORTH SIDE	0.012	0.012	0.000	0.000	5.991	5.991	5.991	5.991	5.991	5.993	5.991	5.996
EAST SIDE	5.680	5.680	5.684	5.683	5.688	5.688	5.686	5.685	5.686	5.690	5.690	5.687
SOUTH SIDE	0.012	0.022	0.007	0.000	5.999	5.998	5.998	5.998	5.998	5.994	5.998	6.007
WEST SIDE	0.362	0.362	0.362	0.362	0.358	0.358	0.356	0.354	0.354	0.347	0.354	0.354

Date	6/15/13	7/2/13	8/1/13	8/15/13	9/3/13	9/17/13	10/1/13	10/15/13	10/29/13	11/12/13	12/2/13	12/16/13
NORTH SIDE	5.987	5.974	5.975	5.975	5.975	5.973	5.973	5.978	5.970	5.980	6.370	6.360
EAST SIDE	5.674	5.679	5.685	5.670	5.679	5.684	5.693	5.696	5.680	5.697	6.417	6.393
SOUTH SIDE	5.990	5.984	5.979	5.981	5.975	5.982	5.938	5.981	5.980	5.981	6.387	6.370
WEST SIDE	0.354	0.354	0.118	0.362	0.350	0.348	0.348	0.348	0.348	0.354	0.136	0.118

Date	1/13/14	1/27/14	2/10/14	2/24/14	3/10/14	3/24/14	4/7/14
NORTH SIDE	6.341	6.340	6.339	6.331	6.328	6.328	6.328
EAST SIDE	6.381	6.373	6.366	6.356	6.342	6.363	6.349
SOUTH SIDE	6.380	6.377	6.367	6.349	6.333	6.341	6.333
WEST SIDE	6.335	6.332	6.332	6.327	6.326	6.326	6.319

* Figures Uncertain

Fig. 1. Record of Levels.

Since September, 1912, when Stone & Webster became interested in this property, levels were taken at regular intervals, as it was considered advisable, prior to taking any definite action, to know exactly what was taking place. The levels given in Fig. 1 indicate the relative motion of the north, east, south and west sides of the holder and reveal a difference in level between the extreme high and low points of the curb angle of 8¼″, the side nearest the river showing the greatest settlement. The readings also show that not only was the entire holder slowly sinking at an average rate of approximately three-fourths of an inch per year, but that the low side was sinking at a considerably greater rate than the high side, namely:

From September, 1912, to September, 1913, the low side showed an increased settlement over the high side of one-quarter of an inch; from September, 1913, to September, 1914, the increased settlement was three-eights of an inch; from September, 1914, to February, 1915, one-quarter of an inch increase.

With these facts at hand it was considered advisable to take action to prevent permanent injury to the holder. Consequently, it was decided to make an effort to re-level the entire holder although it was evident that it would be impossible to prevent further settlement. With the data we had it was estimated that with the same rate of settlement, it would require about 30 years for the holder to again become unsafe, which seemed sufficient insurance against further trouble during the life of the holder. February 1915, when definite action was decided upon, the difference in elevation between the high and low point of the curb angle was 9⅛″.

It was decided to start the work of re-leveling in the Spring of 1915, at as early a date as weather conditions would allow, and the builders of the holder were asked to recommend a plan of action. The outcome of this consultation was that the engineering details of the work were cared for by the Bartlett-Hayward Company, while the actual field work was under the supervision of the local operating department. The Bartlett-Hayward Company sent one of their holder experts to make inspections at frequent intervals, and supplied all special tools, including jacks.

Preliminary to starting operations, test borings were made at three points spaced approximately 120 around the holder, and an analysis of the data from these showed the reason for the settlement. See Fig. 2.

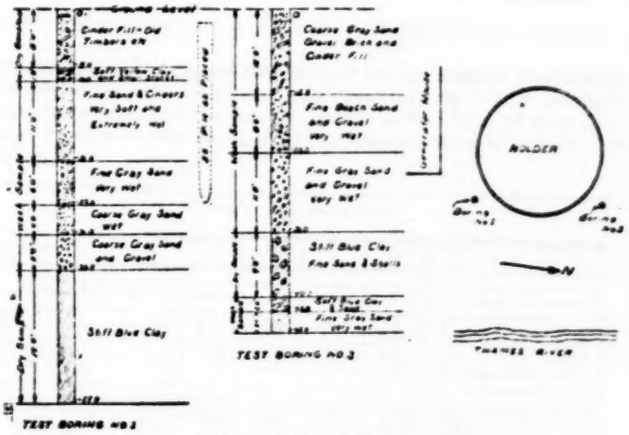

Cinder Fill-Old Timbers etc
Fine Sand & Gravel Very Soft and Extremely Wet
Fine Gray Sand Very Wet
Coarse Gray Sand Wet
Coarse Gray Sand and Gravel
Stiff Blue Clay
TEST BORING NO 3
Coarse Gray Sand Gravel Rock and Cinder Fill
Fine Black Sand and Gravel Very Wet
Fine Gray Sand and Gravel Very Wet
Stiff Blue Clay Fine Sand & Gravel
Stiff Blue Clay Fine Sand Very Wet
TEST BORING NO 2
HOLDER
N
THAMES RIVER

Fig. 2.—Test Borings.

As mentioned the length of the piles driven under the foundation was 18 to 25′. The borings showed that fairly good bearing earth was reached at an average depth of 28′, while 35′ was reached before a first class bearing was obtained. Since, therefore, none of the piles were more than 25′, but very few, if any of them were driven to refusal or to sufficient depth to allow them to carry a reasonable loading. The borings also showed that the ground where the settlement of the holder was greatest was the poorest for supporting a heavy load.

Work was started the middle of March.

When but one sheet was left in the top lift of the holder the inlet and outlet valves were closed and the drips sealed off with water. The remainder of the gas was then allowed to escape through the crown through two ¾″ holes in the man-hole plates.

The holder finally grounded, and evidence of its distortion was apparent from the position of the inlet and outlet stand pipes, which, instead of rising through the man-hole turrets, struck on the edges of these and subjected the crown to severe strains.

For emptying the tank of about a million gallons of water, a 6″ siphon of flanged pipe and fittings was used. In addition to this six ¾″ rivets were cut out of the bottom curb angle, allowing the water to escape here also. By these two means the water was handled in approximately 36 hours.

All the water that could be removed by gravity having been run off, the remainder which had considerable dirt in suspension, was removed in buckets lowered through the manholes; and this done, the tank bottom was flushed out with a fire hose. The entire process of emptying and cleaning the tank occupied about 4 days.

With the tank empty, work was started on the outside around the tank, cutting holes in the concrete foundation for jacks. These holes were twenty in number, located under the landing beams. There are twenty-four landing beams in this holder, but only twenty were under-cut for jacks, as it was not considered necessary to raise the holder on the high side. The jacking holes were 24

wide circumferentially, and extended 3′ under the holder tank. For approximately one-third of this width the under-cut was 10½″ deep to take the jacks, and for the remainder only 6″ deep for inserting oak blocking timbers topped by oak wedges to follow up the jacks, and to relieve the jacks of the weight of the holder.

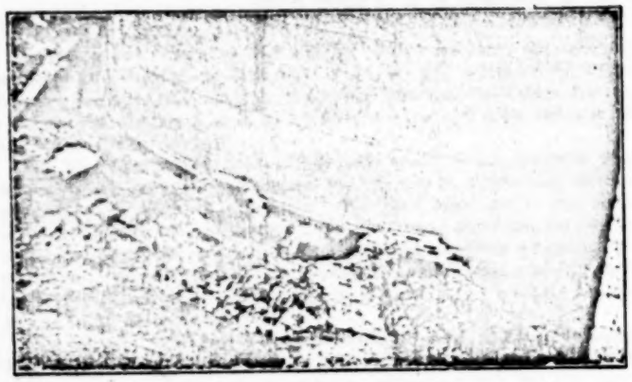


Fig. 3.—Jacking up the Tank.

As the south side of the holder is but 3′ from the generator house wall it was impossible to use jacks under the landing beams at two points, so holes were cut in the tank bottom and by means of jacks placed on the concrete foundation, the weight of the lifts was taken off the tank bottom at these two points. In this way it was possible to get along with follow-up wedges alone on the outside.

From inside the tank, holes 7″ in diameter were cut in the bottom plates for screw jacks to raise the bottom. These holes were flanked on two opposite sides by short pieces of 3′ angle iron bolted to the tank bottom to afford a means of attaching the screw jacks to the tank bottom. In all, twelve of these holes were cut at various places around the tank where settlement required the bottom to be raised. When the holes for jacking within and without the tank were cut, the work of jacking was commenced, the outside work started first, with the following method of procedure:

Twelve short 2″ 10″ ten-ton jacks were placed in the holes cut around the holder, set a little to one side of the landing beams so that the blocking wedges carrying the load were directly under the beams. The jacks were then manned and the tank gradually raised from its foundation.

During the raising, the wedges were kept driven home so that the weight of the structure was carried by the wedges and blocking. Levels were taken at frequent intervals until previously low points of the tank showed an elevation above the previous high points of approximately nine-tenths of an inch.

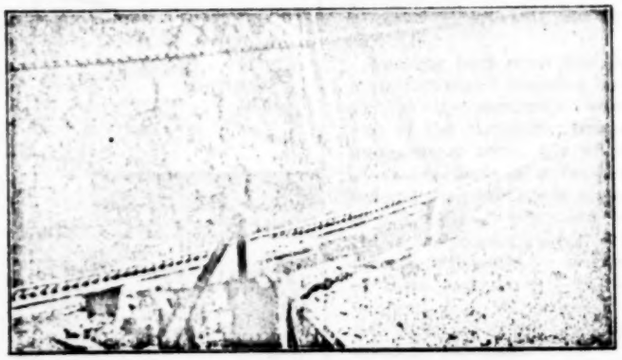


Fig. 4.—Ring of Grout in Place.

A wooden form, with pockets to protect the jacks and blocking, was then built entirely around the tank bottom, and into this form was poured and rammed a heavy grout of 1-3-4 concrete, which was worked under the tank bottom for a distance of about 6′, and of sufficient thickness to fill the space between the foundation and the tank bottom. The maximum thickness of this grout was 9½″, and its average thickness around the entire holder a little less than 5′. The grout was allowed time to set, after which the jacks and blocking were removed and the recesses filled with similar grouting.

After the major part of the external jacking had been completed, but before the concrete was poured, work was started inside the holder, re-leveling the tank bottom. The first step in this work was to raise the center pier, by cutting a hole in the tank bottom, through which a jack was placed on the concrete foundation, and applied to cross braces bolted to the lattice of the center pier, thus raising the pier. Grout was then worked under the bottom plates so as to entirely fill the cavity formed.

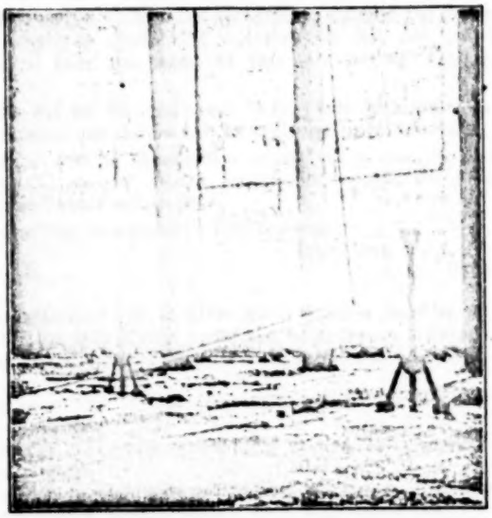


Fig. 5.—Screws used for raising and leveling tank bottom.

The tank bottom was next leveled by means of four raising screws, whose bearing ends rested on the concrete foundation through holes cut in the bottom plates. These four screws were moved from one to the other of the twelve holes cut in the bottom until the desired condition of level was obtained, and the method of placing the grouting underneath the bottom was as follows:

Holes 5″ in diameter were cut through the bottom plates and an extremely wet cement poured through them. At first, a mixture of two parts of cement and one of screened sand was tried, but it did not flow sufficiently far under the tank from the holes. For pouring the cement into the holes, a flange tapped 2′ was bolted over the hole and into this screwed a 3½′ length of pipe, carrying a galvanized iron funnel. Into this funnel the cement was poured and thus forced under the bottom plates. In carrying out this part of the work it was found necessary to keep the grout agitated up to the minute it was poured, or it reached the funnel either too heavy or too light to properly perform its duty.

Fig. 6.—Placing cement under tank bottom.

For the grouting inside and out approximately eight hundred bags of cement were necessary, 50 on the outside 750 within. The operation of jacking and regrouting required in all about 6 weeks.

After re-leveling it was found that although the stand pipes cleared the edge of the holder crown and entered the recesses, they still were far from centering therein, and it was deemed advisable to make them come true. This was done by inserting between flanges, wedge-shaped cast iron fillers of the proper taper.

Several repairs and replacements of minor nature were made while opportunity offered, but nothing of unusual interest was met with. The holder was re-caulked, and repainted, and returned to service without further difficulties.

The summary of monthly levels taken after returning the holder to service revealed the following facts:

Levels taken when the tank had been refilled with water showed an average settlement around the entire holder of approximately ¼" over those taken a few days previous to filling the tank, and no one point settled more than any other point. Levels taken six months after the holder was returned to service showed a total average settlement of $\frac{5}{16}$"; with an increased settlement of the point nearest the river over that on the opposite side of the holder of $\frac{3}{16}$", which corresponds very nearly to the rate at which the low point was sinking before. This bore out our suspicion that it would be impossible to prevent further settlement of the holder, but, in spite of this, we feel sure that at least 30 years must elapse before settlement again becomes sufficiently serious to demand further attention.

After the holder had been in service a short time, a survey of the tank and guide framing was made, which showed that the superstructure had suffered no derangement due to the re-leveling work. The guide columns proved to be very nearly plumb, both tangentially and radially, within the limits allowed in new work of this kind. Upon readjusting the goose neck rollers, the rising and falling of the holder was not accompanied with the excessive side strain on goose necks that had been found previous to re-leveling. These facts indicated that our work was taken in hand in time, and that the holder had suffered no permanent distortion.

The time required for the entire work, from service to returning it to service, was almost 2½ months, with the following staff:

A visiting engineer from the makers of the holder, who made regular inspections during the work; one foreman, two mechanics and 8 laborers.

The total cost of the work, including miscellaneous repairs, re-caulking and re-painting, was $4,100.

It might be of interest to mention that because of the fact that water gas is manufactured exclusively, the problem of gas storage arose, in that we had no other holder, except the relief holder. This compelled us to make gas direct through the purifying boxes and meter to the relief holder, which then became our storage holder. In doing this no serious difficulties were met with, although the purifying material was in very poor condition after the work was completed, and undoubtedly the station meter was guilty of temporary irregularities, due to the higher pressure to which all apparatus between the generator and the holder was subjected.

Tests of Welded and Screw Pipe Connections.

In the spring of 1915, students of mechanical engineering at the University of Kansas made a series of experiments to determine the relative strength of welded and screwed pipe connections. The material was standard weight black pipe made by the National Tube Company.

The specimens tested included two pieces of the original pipe, four butt welds, two connections made with malleable screwed couplings, three welded tees and two made up with malleable screwed fittings; the straight samples being 18" long, the tees made with an 18" run and 15" outlet. The pieces for the butt welds were cut at an angle of approximately 60° to give the V-groove for welding, and the tee welds were made by cutting a hole in the run and butting the outlet against the outside of the run.

Strength of Welded and Screwed Pipe Connections.

	Size of Pipe, Inches.	Average Maximum Load, Lbs.		Relative Strength Welded.
		Welded Connection.	Screwed Connection.	Screwed Pr. Ct.
Tension tests of butt welds and couplings	½	10,222	9,040	113
	¾	21,367	13,835	154
	1	28,330	17,230	164
	1½	43,975	31,270	140
Compression tests of butt welds and couplings	2	72,500	58,150	125
Tension tests of welded and screw tees	½	12,903	8,723	148
	¾	19,763	12,303	160
	1	30,007	17,550	171

The straight samples of ½, ¾, 1 and 1½" pipe were fitted with plugs to prevent the ends being crushed by the jaws of the testing machine, and were tested for resistance to tension in the usual way. The samples of 2" straight pipe were cut off to lengths of 5" with the ends square, and tested under compression. For the tee welds a holder was made to fit the run of the tee at either side of the joint, the end of the holder placed in the upper jaws of the testing machine, with the outlet held in the lower jaws, and the samples tested by tension.

The behavior of the welded connections under tension corresponded closely with that of the original pipe. Some of the specimens broke outside of the weld and some in it, and all of the screwed connections broke at the last thread in the fitting. The 2" pipe tested in compression bulged out on either side of the weld or split along the pipe seam as far as the butt weld, which held without splitting. One of the screwed fittings sheared the threads and telescoped, while the other bulged outside the fitting. In most cases the welded tee connections broke in the outlet at some distance from the weld, while all of the screwed fittings broke in the casting.

Cost of Pipe Connections

PIPE SIZE	½"	¾"	1"	1½"	2"	3"	4"
WELDED BUTT JOINTS							
Time min	3	3½	4	5	6	10	12
Oxygen cu. ft.	0.28	0.45	0.78	0.86	1.51	2.51	4.76
Acetylene cu. ft.	0.33	0.41	0.76	0.92	1.47	2.49	4.63
Welding wire oz.	0.08	0.15	0.20	0.30	0.50	1.00	1.00
Cost—							
Labor @ 30¢	$0.0150	$0.0175	$0.0200	$0.0250	$0.0300	$0.0500	$0.0750
Oxygen @ 4¢	.0028	.0038	.0112	.0120	.0368	.0502	.0952
Acetylene @ 4¢	.0046	.0058	.0168	.0184	.0294	.0498	.0926
Welding wire @ 12¢	.0006	.0011	.0015	.0023	.0038	.0120	.0120
Total Cost	$0.0230	$0.0334	$0.0515	$0.0647	$0.0934	$0.1610	$0.2868
SCREWED COUPLINGS							
Cost of Fittings	$0.02	$0.03	$0.04	$0.06	$0.11	$0.27	$0.47
Cost of Making up Joint	0.02	0.02	0.03	0.03	0.04	0.06	0.07
Total Cost	0.04	0.05	0.07	0.11	0.15	0.33	0.54
WELDED TEE JOINTS							
Time min	4½	6	5½	7	9	15	22
Oxygen cu. ft.	0.61	0.81	1.05	1.34	2.26	4.02	6.98
Acetylene cu. ft.	0.55	0.73	1.01	1.29	2.20	3.88	6.30
Welding wire oz.	0.20	0.40	0.50	1.00	1.40	2.40	6.20
Cost—							
Labor @ 30¢	$0.0225	$0.0250	$0.0275	$0.0350	$0.0450	$0.0800	$0.1100
Oxygen @ 4¢	.0082	.0122	.0140	.0268	.0452	.0804	.1396
Acetylene @ 4¢	.0070	.0118	.0202	.0258	.0440	.0776	.1260
Welding wire @ 12¢	.0015	.0030	.0045	.0075	.0105	.0225	.0715
Total Cost	$0.0392	$0.0520	$0.0732	$0.0951	$0.1447	$0.2605	$0.4471
SCREWED TEES							
Cost of Fittings	$0.06	$0.05	$0.08	$0.14	$0.18	$0.31	$1.02
Cost of Making up Joint	0.03	0.03	0.04	0.04	0.05	0.06	0.09
Total Cost	0.09	0.08	0.12	0.18	0.23	0.37	1.11

Cost of Screwed and Welded Connections.

In the tension and compression tests of the butt welded and unwelded pipe, the elastic limit of the two did not differ appreciably. The screwed coupling specimens broke without elongating because of the reduced cross-sectional area at the threads. The elongation of the 6" test sections was less for the welded than for the unwelded pipe.

The results show that the strength of the welded connections are from 13 to 71% greater than the malleable screwed connections.

The other table shows the cost of making pipe connections by the two methods, figuring oxygen and acetylene at 2 cents per cubic foot. The principal item of cost in the screwed connections is the fitting, and in some cases the welded joint is less than that of the fitting, the lower cost of the welded joint being more marked as the pipe size increases.

Intensified Selling Applied to Water Heaters.

From paper by A. A. HIGGINS, to the New England Association of Gas Engineers.

As this paper refers to the sale of water heaters, we will not consider the merits of different types, or the selection of water heaters for sale, but assume that this has been well done by the Commercial Manager, and he is now confronted with the sale of the water heater chosen.

We all have water heaters for sale, good water heaters, well made, as ornamental as necessary for the use to which they will be put, and very high in efficiency. We have good gas to run them with and plenty of cold water. We also have good gas service to make the customer contented and satisfied, possibly proud of his purchase. A water heater is needed in every home, and in nearly every business place. Then, why is it that water heaters are not in use in all of these places?

The answer is: Lack of salesmanship! And until every home and nearly every business place has a gas water heater in use, it will remain our fault for not making plain to every one the many advantages they possess and the beautiful service they give.

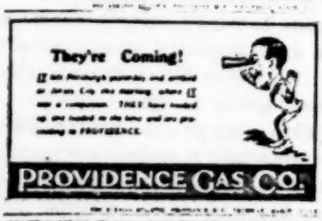
The main question is how are we going to let all the hot water users on our lines know about it. What form shall our salesmanship take?

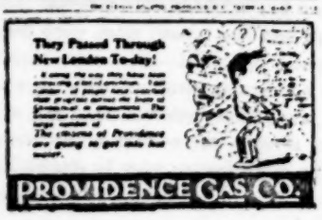
Salesmanship is of two kinds, spoken and written. Spoken salesmanship is like a rifle, which shoots but one missile at a time, because the salesman usually meets but one customer at a time. Written salesmanship is like a shotgun, which shoots thousands of missiles at once, because newspapers and other advertising matter are spread broadcast daily among those who purchase our product. It is necessary to use both for this work, advertising for the big ones, and salesmen to gather in those not gotten by advertising.

It is necessary that the entire sales organization should concentrate for a time on water heaters; generate great enthusiasm over water heaters, for a time, and get your entire organization to do the same.

During the past year the idea of making a special drive on water heaters has been successfully tried by a number of gas companies, and with astonishing results. Some of the gentlemen present will no doubt relate their experiences in this direction, and as the writer has been requested to give some figures from the Providence Gas Company's Water Heater Campaign, he begs to submit the following:

It was evident that our customers either did not know, or appreciate, the value of gas water heaters in the home, shown by the purchase of only a limited number, and it was decided to try unusual methods. Accordingly, 1,000 tank heaters were ordered for immediate shipment, notwithstanding that our sales for the whole of the previous year were only 628.





Looking back upon this step it appears that it played a large part in the successful operation of the campaign, because immediately after the arrival of two carloads of water heaters and their storage in a place in full sight of every one, our entire organization became intensely interested in diposing of them, and when it was announced that we proposed to sell them all in one week, enthusiasm increased.

This printed slip of the size to fit the pay envelopes, with one folding, found its way to all of our employees on the Wednesday preceding the Monday starting the sale, and it was wonderful to note the co-operation received from them:

"We are about to attempt to sell 1,000 water heaters in one week. This is a gigantic undertaking and it is necessary to accomplish the sale of this quantity in order to justify the low price which we are making.

With this end in view it has occurred to us that the co-operation of every employee would add materially in this sale, and I especially request that you speak of this sale among your acquaintances.

The sale will be for one week only, from March 22d to March 27th, inclusive, but orders will be received from this date.

The price will be seventy-five cents (75c.) with the order, and one dollar ($1.00) per month for twelve months, for a Vulcan or Ruud water heater connected.

Thanking you in advance, I beg to remain,

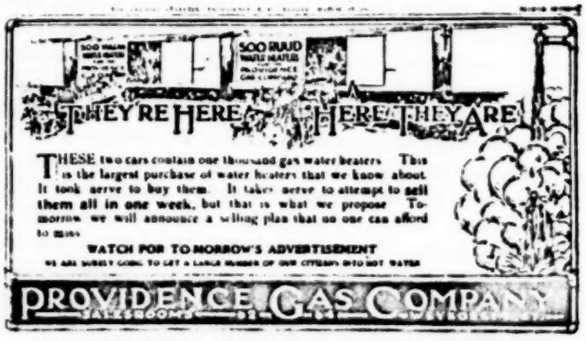
Yours very truly,

A. A. HIGGINS."

It was estimated that if 1,000 water heaters could be sold, $1.00 per heater for advertising would not be excessive, and advertising was prepared to cost $1,000. A local artist was employed to illustrate it.

These were run, in the order shown, each day during the week preceding the sale. This is known as "teaser advertising," the idea being by continuity of thought to gradually increase the interest of readers.

In addition to newspaper advertising, a window display was built of cement blocks, representing a fort, with water heaters protruding through port holes as cannon, a silk flag fluttering from the top, and the whole was labeled, "War on Cold Water." This window attracted a lot of attention and favorable comment.


500 RUUD WATER HEATER
THEY'RE HERE
HERE THEY ARE
THESE two cars contain one thousand gas water heaters. This is the largest purchase of water heaters that we know about. It took nerve to buy them. It takes nerve to attempt to sell them all in one week, but that is what we propose. Tomorrow we will announce a selling plan that no one can afford to miss.
WATCH FOR TOMORROW'S ADVERTISEMENT
PROVIDENCE GAS COMPANY

HERE'S THE PLAN
We Have Bought 1000 "VULCAN" and "RUUD" WATER HEATERS
OUR OFFER
We offer them INSTALLED COMPLETE including all necessary piping
Brass Water Pipe and Iron Gas Pipe
For Only $12.75 Each
This is an unsurpassed bargain in fact, the LOWEST PRICE ON RECORD
Visit Our Salesrooms and See the Demonstration
PROVIDENCE GAS COMPANY

The following is the sales, day by day:

Orders March 18-19-20 (before start of sale..	144
" 22.....	279
" 23.....	203
" 24.....	197
" 25.....	134
" 26.....	170
" 27.....	254
Total.....	1,381

That the sales were well made is evidenced by the fact that only 26 cancellations were received, and but 12 removed after installation. Nineteen were sold for cash; 52 on straight charge for full amount; and 1,310 on lease.

The price was $12.75, 75 cents with the order, and $1.00 per month for one year. No outside salesmen were used, the results obtained by advertising. The installing of the heaters was done expeditiously by the distribution department, in about 30 days, at the end of which time, in order to keep the fitters employed, and to satisfy a very popular demand, the offer was made for another week, resulting in the sale of 484 heaters, making a total of 1,865 sales, with 36 cancellations and 17 removals, or a net of 1,812 heaters.

The cost of selling, exclusive of our usual store expenses, was:

Advertising, first week, including newspaper space, artist, signs on wagons and store, $988.56, or 71.6 cents per sale. The second week cost $182.44, or an average of 37.6 cents per heater sold. Combining the costs, we have a total of $1,171 with gross sales of 1,865 heaters, or 62.8 cents per order taken.

The cost of heater plus installation was $13.68, representing a loss of 93 cents, which, plus the advertising, shows a net loss of $1.56 per heater, which is $2,909 40 tota cost of installing 1,865 heaters.

On January 21, 1916, the amount of delinquent payments amounted to only $256.16.

It appears that intensified selling, which in this case consisted of a combination of something that many wanted, a specially low price and easy payments, and a generous amount of advertising, produced in two weeks results that would require three years under previous methods, and the loss is overcome by the specially low selling cost and the very material advantage of having so many water heaters in use. Another very material advantage was that no capital investment in services, meters, or main extensions was necessary.

It is also interesting to note the effect of installing a large number of water heaters at a special price, upon future business, as it was feared that the price and the large number installed would perhaps decrease sales. From June 1st to January 1st the sales for 1915 were 683 as against 367 the previous year, which indicates that the tank heater is an advertisement itself, and influences the sale of more heaters.

Lessening Cost of Valuation of Public Utilities.

Men of broard experience on public utility commissions and staffs can save much expense and litigation in valuation and rate cases. Such men are able to arrive at results by methods of approximation, thus lessening the volume and cost of the evidence required from both the corporation and the public sides to the case. Where this breadth of experience is lacking, the evidence must be presented in far greater detail, coupled with comparative analyses of experiences had elsewhere, in the hope of making the force of the claims clear to the reviewer.

In water-works valuation and rating cases the joint expenses of trial to the parties at issue have often amounted to from 10 to 15% of the total value of the property. Not only do courts, commissions and arbitration boards recognize the burdensome character of this expense, but the lawyers and experts also. Conscientious effort is generally made to eliminate by agreement, in advance of the trial, as many of the issues at bar as possible, with a view to decreasing unnecessary expense. In court trials it often happens that while both parties may in good faith desire to bring about an agreement, the political situation may make it impossible to undertake it without incurring the danger of having the subsequent decision called into question because of such joint effort. In these cases public utilities commissions are in a position to be of marked service to the parties to the issue.

Some significant departures have been made by commissions from the ordinary legal methods of trial, to decreasing the expenses involved in such litigation. Thus, in the valuation of the water works property of the Macon Gas Light and Water Company, the board of seven arbitrators, consisting of five engineers and two bankers, outlined and adopted the following course of precedure in the interest of economy of time and expense: (1) Counsel opened with a historic sketch of the situation; (2) the witnesses for the corporation, and then for the city, stated their qualifications, the nature and extent of their investigations, and their findings, briefly and without the intervention of counsel, either in direct or cross-examination; (3) counsel on both sides then discussed intangibie or semi-intangible values; (4) any witnesses desired were recalled by the board at the request of counsel on either side, for cross-examination.

The program outlined proved acceptable to the parties at issue, and the trial was concluded in two weeks, at a cost of about 3% of the amount of the award, instead of 15%, which it might have been had ordinary legal methods or procedure been followed. More recently the Master in Chancery of the Federal Court of the District of California in the trial of the Spring Valley Water Co. rating cases at San Francisco, modified the ordinary methods of court procedure. He heard all the evidence upon the real estate values before admitting evidence upon structural values. Next, taking up structural plant, all of the experts gave their evidence in the form of a connected story unaided by counsel, upon a single group of property, such as earth dams, or pumps, or conduits. Counsel was permitted to cross examine the witnesses after the giving of this testimony and before taking up the next class of items. Incidentally the experts upon the one side were at liberty to question the experts of the other, and to assist the court by statements of their own experience. The master has said that the time consumed has probably not been over one-third to one-half what it would have been if ordinary methods of court procedure had been followed. Furthermore, the master was in position to form judgment upon the various phases of the case as the evidence was adduced and while the subject was fresh in mind.

In a recent hearing before Judge Sessions, at Grand Rapids (Ann Arbor vs. State of Michigan), the court limited the cross-examination practically to questions touching upon the qualifications of the witnesses, their honesty of purpose, the soundness of the theories advanced by them and the major items entering into the estimates of the engineers—refusing to consider petty items as likely to have little effect upon the decision. The trial was concluded in six days, which is certainly a remarkably brief hearing for a case involving property values of ten million dollars, more or less.

Another suggested departure is the appointment by the court, of a disinterested engineer of experience to aid it in judgment; in effect calling the engineer to sit upon the bench with the judge, to pass upon technical matters and to aid in limiting the lines of investigation to matters of fundamental importance.

The observations here made upon court trials apply in some measure to trial by commission and serve to accentuate the desirability of having competent engineers as well as lawyers and business men appointed to our public utilities commissions. The engineering, as well as the legal, point of view is of great importance in assisting to expeditious and equitable solution of public utilities problems.—From the Presidential Address to the New England Water Works Association.

Accidents that Could have been Prevented.

An employee dropped the tongue of a coal buggy on his foot. This is just carelessness and needs no comment.

When walking beside a loaded coal car an employee was struck on the head by a lump of coal falling from the car. If the car had been properly trimmed this accident would not have happened.

While lowering a tank in a boiler room, a rope sling broke and caused an employee to fall into a coal pile. This shows a lack of proper inspection of tools.

An unlamped pipe horse extending into the roadway caused an accident to a pedestrian on a stormy night. All obstructions on the public highway should be lamped at night and flagged during the day. —The latest bulletin from Mr. J. B. DOUGLAS.

Telephone • John, 2996.

THE AMERICAN GAS LIGHT JOURNAL

Cable, • Am Gas.

Entered at the Post Office, New York City, as Second-Class Matter.

SANFORD K. CAMPBELL, Editor.

Published Weekly by The American Gas Light Journal, Inc., at 42 Pine Street, New York City.

ELBERT P. CALLENDER, Pres. and Treas. FREDERICK A. SOUTHWORTH, Vice-Pres.

CHARLES H. WADELTON, Secretary and Manager

NEW YORK, MONDAY, MARCH 20, 1916.

National Gas Range Week.

The week of May 8th-13th has been set aside as National Gas Range Week. The National Commercial Gas Association, in announcing the dates selected, calls particular attention to the importance of preparedness in planning well ahead in order to benefit to the fullest extent from the publicity that will come from an intensive campaign throughout the country.

Last year very many of the companies had gratifying sales increases from this effort, and this year every company in the country should actively co-operate in the national movement to stimulate interest during this week.

An exchange of ideas and plans is a necessary part of co-operation, and the N. C. G. A. asks every gas company to send to Association headquarters photographs of window displays used last year during Gas Range Week, and descriptions of displays to be used this year.

The Association will offer $100 in prizes for the best displays planned by members of the Association and used by their companies this year. Companies are urged to allow all their employees to enter this competition, as valuable ideas may be offered.

Manufacturers of appliances are anxious and willing to co-operate in supplying ideas and material for displays, as well as advertising literature. Every company should communicate with the manufacturer whose appliances it handles, asking for whatever help he is prepared to give.

And don't be caught short of stock. You will be swamped with orders if you enter aggressively into the campaign, and if your stock runs low you may not be the only company unprepared to fill orders—so order now and prevent loss of business, by having the ranges.

Do not wait until a few days before Gas Range Week to prepare your advertising matter. Start to do this now.

If you will send the Association the copy you used last year, they may be able to suggest something with sales producing power that you can use.

It will be necessary, of course, to plan all your special features before you prepare your advertising—therefore decide now what you will do with regard to the following:

What are you going to do in the matter of—

Special prices.

Drive on sale of special types of ranges.

Free miscellaneous appliances, such as gas iron, ironing boards, lamps, etc., with each range sold.

Prize contests—Such as giving away a portable lamp or gas range, heaters, etc., by prize drawings.

Special demonstrations in your show rooms.

Special entertainment—Many companies kept open house last year, supplied refreshments and music during the week, decorated their show rooms; and had the floors crowded.

Sufficient sales force—Last year many companies were unable to keep up with the business and had to add extra salesmen. Be sure you have sufficient sales force, and have the entire organization well posted on the objects of Gas Range Week. The enthusiasm of your organization will help in making the week a success.

Display banners and outdoor decorations—Many companies last year decorated the outside of their buildings with banners and signs.

In many places it will be possible to get other merchants interested in the campaign, perhaps only to the extent of letting you put show cards in their window, or some of them may also make capital of Gas Range Week by special offerings of their own. You can help your results by creating some local co-operation.

Memorial Resolution to B. W. Perkins.

At the meeting of the Society of Gas Lighting, held on March 9th, the following memorial resolution was presented:

BENJAMIN WILTON PERKINS.

It is with a deep sense of lamentable loss that we learn of the death of our friend and member, Benjamin Wilton Perkins, who died after a brief illness at Hartford, Conn., on Feb. 11th, 1916.

Born in London, England, on September 27, 1859, he came to this country with his parents when nine years of age and settled in Cincinnati, Ohio. He later entered the gas business under his father, who was manager of the South Bend (Indiana) Gas Company. Step by step, Mr. Perkins rose to be manager of the Company, which he served faithfully for thirty years. From South Bend, he moved to Altoona, Pa., to assume the position of manager of the Altoona Gas Company, which he held for four years. Thence, he moved in May, 1910, to Hartford, Conn., to become general manager of the Hartford City Gas Light Company, which position he held until the end with much honor to himself, satisfaction to his townspeople and profit to his Company.

He joined this Society in October 13, 1910, and took an active interest in its meetings and discussions. His stable qualities, sound judgment and wide experience, were of much value in our discussions, while the papers he contributed were notably practical and helpful.

As a companion, he endeared himself to his fellow members. He was a friend sincere and true. We deeply feel his loss.

For the Society of Gas Lighting.

J. ARNOLD NORCROSS,
EDWIN WITHERBY,
E. H. EARNSHAW,
Committee.

Time Between Pacific Conventions.

Heretofore it has been the custom of the Pacific Coast Gas Association to hold its annual conventions in September, the location alternating between the northern and southern parts of California. Men have come from far and wide to these re-unions, which have been distinguished for their attractive social features and their real value as a means of exchanging ideas upon questions concerning the spread of the gas industry on the Pacific Coast. The attendance at the conventions has been gradually increasing for some years past, and now, under the new administration, headed by Mr. F. A. Cressey, Jr., it is proposed to bring the members of the Association together at informal gatherings, one in the north and one in the southern part of the State, before the time of the annual convention.

The first of these meetings was a get-together dinner, on February 17th, at the Sutter Hotel, San Francisco, and the experiment proved a genuine success. In round numbers, 100 members of the association attended, and from start to finish the evening was one of real benefit to the cause, aside from the pleasant social intercourse.

President Cressey was in the chair and acted as toastmaster, and reports of progress were given by the various committees. The Committee on Gas Engineering Degree, in the absence of the chairman, Mr. John A. Britton, reported by Prof. H. L. Cory, of the University of California. The report was of unusual interest, and showed that the recently established course had "caught on" to a remarkable degree, so that this year gas engineering in the university curriculum had been placed upon a basis of equality with other branches of engineering. Eighteen sophomores are registered for the course, in addition to a number of upper class men who had already taken it. The thanks of the committee were expressed to the men of the industry who had aided the course with lectures at the University. Announcement was made that the lectures this year would be by Messrs John A. Britton, E. C. Jones, C. B. Babcock, S. W. Coleman, and Van E. Britton. Prof. Cory in the name of the President of the University invited members of the Association to make use of the laboratory, library and other facilities at the University to assist them in solving their problems. It was the desire of the University, he said, to co-operate in every way with the men of the gas industry. Prof. R. S. Tour, instructor in gas engineering, and Prof. Raber of the Mechanical Engineering Department, responded to calls for an address. Prof. Tour described how the gas engineering course had been included in the University curriculum, and compared it in scope and detail with that given at the University of Michigan. Prof. Raber dwelt upon the necessity for full co-operation between the university and the manufacturer as a sine qua non in the development of engineering science.

Mr. Chas. P. Cutten, chairman of the Legislation and Taxation Committee, discussed the problem of legislation for the protection of the gas business. He thought the franchise tax of 5¼% now paid by gas companies an undue burden. He also called attention to the growing importance of securing indeterminate permits in place of limited franchises, for the protection of the investment, and favored an amendment to the State Constitution placing the granting of franchises in the hands of the Railroad Commission.

The report of the Library Committee was mainly a description of the new catalogue in course of preparation. It was announced that the library would have quarters in the new "Pacific Service" building in San Francisco in conjunction with the company's library, a distinct benefit to the members of the Association.

The Advisory Board invited unlimited call upon its services in the solution of the various problems that confront gas men from time to time. Chairman L. E. Jones assured the members that all correspondence with the Board would be treated as strictly confidential.

The Committee on Piping of Buildings for gas, R. J. Thompson, Chairman, announced the preparation of standard specifications for piping buildings, the intention being to have these formally adopted by the Association at the annual convention.

The Membership Committee, C. B. Babcock, Chairman, reported the receipt of 43 applications for membership.

The Gas Exhibit Committee announced progress of arrangements for a suitable exhibit at the convention in Santa Barbara.

Mr. John Clement, editor of the Experience Department, and Mr. F. S. Myrtle, editor of the Publicity Department reported progress.

Secretary Bostwick congratulated the Association upon the success of this first get together dinner, and announced a similar gathering in Los Angeles about the middle of May. Excellent papers are in course of preparation for the annual convention and prospects are good for a successful gathering.

Mr. E. C. Jones, past president of the Association, announced with regret the departure of Mr. Harry L. Strange, of Honolulu, one of the Association's most active members, for Europe, in response to a call to the theatre of war. On Mr. Jones' suggestion, the following cablegram was sent to Mr. Strange:

"The Pacific Coast Gas Association, assembled, sends its love and best wishes. God bless and keep watch over our Harry Aloha."

A notable absentee was Mr. John A. Britton, who was in New York on a business trip. The members present drank his health, however, and drew up the following dispatch to be forwarded to him:

"The Pacific Coast Gas Association at its first get together dinner, sends greetings to the Father of the Association and wishes him long life and happiness."

Among others who were unable to attend, and sent messages of regret, were: Mr. C. B. Babcock, Champ Vance, Paul E. Haugh, B. S. Pedersen and Frank C. Packer.

[OFFICIAL NOTICE.]

Illinois Gas Association.

OFFICE OF THE SECRETARY,
OAK PARK, ILLS.

The Twelfth Annual Meeting of the Illinois Gas Association will be held in Chicago, March 22d and 23d, 1916. The papers will be divided into four classes: General, Manufacturing, Distribution and Commercial.

Headquarters will be at the Hotel Sherman, and a very interesting and instructive program has been prepared, as you will note from the list of papers obtained by the Technical Committee:

"Gratuitous Work in the Gas Business," by Albert L. Tossell.

"Constructive Advertising," by John W. Lansley.

"Some Fundamentals Affecting the Utilization of Gas Oil in Carburetted Water Gas Manufacture," by R. C. Downing.

"Disposal of Gas House Wastes," by Paul Hansen.

"Stores Accounting," by William A. Sauer.

"Solicitors and House Record Cards-Methods of Checking," by E. D. V. Dickey.

"The Efficient Use of Gas in the Home," by W. H. Forbes.

"Industrial Welfare Work," by S. H. Moore.

"Functions of Trade Journals," by Milt Saul.

"Investigations of Bunsen Gas Burner Design and Operation," by G. C. Carnahan.

We will have reports from the various committees—Public Relations, Rates, Affiliation, Gas Engineering, etc.

The Entertainment Committee has selected Thursday evening, March 23rd, for the banquet, which will be held at the Hotel Sherman. The price of banquet tickets will be $3, instead of $5, and an extra good banquet and program are promised. Mr. H. M. Byllesby will be our toastmaster; Rev. Dr. F. W. Gunsaulus will talk on "The Latest Mastery of Light," and Mr. W. E. McKay, President of the American Gas Institute, will speak. The vaudeville will be omitted this year, but other unique features will be added.

We are constantly striving to make this Association of greater value and assistance to gas men. To broaden our field we should have every gas man in the State as a member of the Association. We now have 400 members, but will fall short of the 500 mark unless we have your valuable assistance.

HORACE H. CLARK, Secretary

Factory Lighting; and the New Lighting Code.

From paper by C. E. CLEWELL, to joint meeting of the New York Sections of the American Society of Mechanical Engineers and the Illuminating Engineering Society.

The actual working conditions in many factories are such that it is necessary, even in these days, to emphasize the obvious principle that life, whether in the home, the office or the workshop, demands for its welfare a fairly definite kind of environment, if its forces are to be conserved. The idea, therefore, that one set of living conditions is a standard for the home or office, while another constitutes that of the factory, may well be looked upon as a handicap in this repect to the factory workman, which makes his effort to maintain health a more difficult task than that of the more fortunate who labor under better surroundings.

It is hardly necessary to enumerate the factors that go to make up these conditions, but a simple illustration will bring out the point. Take the office for example. It is important here to maintain suitable temperature during winter and summer months; to supply pure fresh air, adequate light by day from windows sufficient in size to admit a generous supply of natural light, and by night from artificial illuminants properly placed and in such numbers to meet ordinary needs; to maintain cleanliness and sanitary conditions; to have pure water for drinking; and to provide proper ventilation for the removal of impure air. This is a list of primary requirements that may seem trival compared to items of larger interest, but they make life tolerable or intolerable by their presence or absence.

Even to the casual observer of industrial life, it is a striking thing that a difference is set between the standards of environment in the shop and elsewhere. This is inconsistent, because of the common factor—*human life*. On this basis alone there should be no difficulty in accepting the proposition that forms the underlying thought of this paper, namely, that the fundamental requirements for comfort, health and efficiency, are applicable not only to the home and the office, but should be looked upon as inclusive and applicable, in a general way a least, to industrial conditions.

Industrial Changes.

Accepting this principle, it follows that the temperature in which the worker finds himself should be maintained at a suitable value for health's sake as well as for the sake of improved workmanship; similarly, adequate ventilation, and the proper installation and maintenance of lighting facilities are important.

The employee has greater difficulty in these days to protest against intolerable environment. In earlier days the proprietor of a small factory gave personal supervision to a handful of employees, whose interests were his interests and where the complaints of the few were easily met because conditions were simple. Now thousands of workmen take the place of the smaller numbers, and in the larger plants, a small group of employees reports to a subforeman, he, in turn, to a foreman, then to the general foreman, the assistant superintendent, superintendent, general superintendent, and perhaps a manager of works. Is it not natural, therefore, that the employer has become more or less impersonal? Complaints by the individual must traverse a labyrinth before reaching the almost invisible force that guides the destiny of the working classes.

Statistics show that in the 50 years between 1850 and 1900, the population of this country increased by about 200% but the wage earners in manufacturing increased by about 400%. In 1850 4% of the total population were wage earners in manufacturing, while fifty years later it had increased to 7% of a greatly increased total population, and in some individual states to over 20%.

In fifty years the capital invested in manufacturing increased by over 1,800%, the iron and steel industry in 30 years over 400%.

Is it not reasonable to conclude that this phenomenal growth has resulted in an unusual effort to keep up with the demand for greater output, often to the exclusion of interest in the physical surroundings of the worker? New factory space has repeatedly been required. Many plants, from necessity, have rapidly developed and expanded in size, and new buildings, often of a temporary nature, have been added, sometimes at great distances from the central heating and lighting systems, only later becoming a permanent part of the plant. Those responsible for the manufactured product have thus perhaps overlooked many items of comfort, convenience and efficiency, which at the time may have seemed to have no direct relation to the output.

New Influences.

Stabilizing influences have gradually begun to develop. Departments for considering the welfare of the employees have been formed; safety first organizations have come into existence; organized labor has, in a way at least, moulded public opinion where the employer has grossly neglected its rightful interests; the efficiency movement has directed attention to avoidable time losses. Among these causes have been included poor ventilation, inadequate lighting, and gloomy shop conditions, which, in the past, have been so common.

Attention has been called to cases typified by a workman standing before a machine, who must hold his finger on the rule when measuring the work, and then walk to the nearest window to see the markings of the scale, because his machine is not properly lighted.

Physical as well as Economic Losses.

There is, however, another side. Unnecessary motion reduces the physical resources of the workman. The poor light affects his vision, produces eye fatigue, and increases the risk of permanently impaired vision. It follows, however, that while the employer is first concerned with the economic aspects, the installation of suitable means for reducing these financial losses also aids the health and comfort of the man at his machine. No matter, therefore, which manner of approach is assumed, either the economic, or the desire for improved working conditions, the whole matter is helped.

Another possible influence is hinted at by Dr. G. E. de Schweinitz, the eminent opthalmologist, who raised this point: "Would it not be a good thing if there was a department of the National Committee for the prevention of blindness, to which application could be made for the latest information on illumination?" The thought here is that from the purely medical standpoint, it is recognized that illumination should be made the object of scientific study to determine the best means to conserve eyesight.

The situation is summarized very well in this introduction to recent legislative orders in Wisconsin: "There is a general awakening among manufacturers to the economic value of conserving the human equipment in their plants, and there never was a time when so much attention was being given to the subjects of shop lighting, elimination of dusts and gases, fresh air, and general cleanliness. The manufacturers who have done the most along these lines are the most enthusiastic in the recommendation of their practical value."

Education up to this viewpoint, as outlined by the Industrial Commission of Wisconsin, is one of the greatest needs of the present time, for while the foregoing hints that this viewpoint is common, there are still many places where it is not recognized. The prevailing ignorance on the simpler items of shop environment is almost beyond comprehension in many instances, not usually due to inability to master the points involved, but rather *because such matters have never been given attention.*

Preliminary Work of the Code Committees.

As a preliminary to the work on the new code, a study was made of existing lighting legislation. The shop lighting orders of Wisconsin, and the legal enactments of New York State stand out prominently, the efforts of these two States being the most systematic work along this line. Digests of all legislation related in any way to lighting were obtained at considerable expense from one or two other States, and less complete data from a number of others; all showing that nothing of any practical value exists in a majority of the State laws concerning industrial lighting.

In 1914 the Industrial Commission of Wisconsin issued a handbook on shop lighting, in conection with its orders on that subject, and the general scheme of this handbook has been followed in the development of the new code.

In presenting this code, the committees have accepted and emphasized a number of means whereby improved lighting may be encouraged in the industries. These include some influences not based on legislation, and which have seemed sufficient reason for drafting the code in popular language rather than in legal phraseology. This is considered of advantage, because any factory owner or manager can take the intent of the various articles, and

apply them to his individual needs; and at the same time the matter is so arranged that a legislative body may readily transform it into regulations.

Among the influences that the committees have recognized as effective, and which may be expected to aid in raising the standards of factory lighting, the following are of special importance:

(*a*) The interest of factory owners and executives in the economic returns promoted by better lighting.

(*b*) The effect of public opinion, indicated by the popular and technical press, in directing attention to better factory environment.

(*c*) Compensation laws and their effect in bringing about improvements in methods for preventing accidents.

(*d*) State and municipal legislation that tends to place industrial lighting on at least a minimum standard basis.

Requirements of the New Code Moderate.

The fact that many industrial plants in States not having lighting legislation, possess illumination facilities of a higher standard than required by the legal enactments in other States or than required in the new code, is an indication that dependence can be placed on influences other than legal requirements in the efforts to improve industrial lighting. At the same time, ignorance of the possibilities and neglect are apt to prevail, and it is for these cases that legislation is needed.

This point is emphasized in the recent British Report of the Departmental Committee on Lighting in Factories and Workshops, where the following statement is found:

"On the other hand, it must be admitted that many employers have lagged behind in the general advance. This applies especially to old factories, designed before the importance of illumination was generally recognized, and to small workshops, of which the occupiers perhaps hesitate to expend the capital necessary for improvement.

"It is obvious that any requirement which would tend to bring such places up to the level of the more progressive firms would be beneficial, not only to the operative by improving his working conditions, but also to the employer himself by increasing his output. Light is a cheap commodity, and little or no hardship should result from such requirement, if gradually and sympathetically enforced."

To those who have given some study to the questions of factory lighting, it is apparent that the field is complex, and this feature has introduced difficulties in preparing the code. After a review of the points involved, it was decided that the logical method of proceduce was to draft the articles to cover representative cases including the probable extremes. To offset the inability to place any given factory section in its proper class when none of the listings in the code seem to fit the circumstances, it has been suggested that expert assistance be relied upon.

The code consists of three main divisions, the first containing eleven articles suggested as a basis for legislation; a second includes eight rules that should be observed in factory lighting practice, intended somewhat in the nature of a supplement to the articles; and the third devoted to explanatory notes bearing on the fundamentals of modern illuminating engineering, with special reference to factory conditions.

Brief Analysis of the Code.

An analysis of the code articles shows that they cover natural and artificial lighting, and artificial lighting is treated from the standpoints both of gas and electric supply. The features of natural lighting, discussed at considerable length in the explanatory notes, have therefore been looked upon as equally, if not more important, than those pertaining to artificial light, although it has been possible to treat the latter somewhat more in detail. In a general way, however, such topics as maintenance, for example, have been so worded as to apply either to natural or to artificial lighting.

The method of specifying the quantity of illumination on a basis of intensity is in accord with modern practice. In one instance of state legislation, quantity is specified in terms of candle power per square foot, but this is open to the objection that it does not specify the illumination on the work, a very important feature. The intensity values given in Article V, seem to meet this objection, while the appended paragraphs give the candle power per square foot equivalent for a given intensity value, thus making the method intelligible to the average mind. It is important to note the recommendation that a portable photometer or illuminometer be employed to determine intensities in existing systems, particularly where uncertainty prevails.

Importance is also attached to the proper lighting of roadways, yards, stairways, passages and places not usually frequented. Records of industrial accidents indicate the need of greater care in providing light for these more or less out of the way places.

Article XI, refers to auxiliary lighting. This is a safety-first precaution, and follows a similar ruling in the buildings coming under the control of the Bureau of Water Supply, Gas and Electricity in New York City, particularly such as are occupied by large numbers of people.

As an encouragement to improvements in factory lighting, the more important advantages of good lighting have been compiled in a list. These are:

1. Reduction of accidents.
2. Greater accuracy in workmanship.
3. Increased production for the same labor cost.
4. Less eye strain.
5. Promotion of better working conditions.
6. Greater contentment of the workmen.
7. More order and neatness in the plant.
8. Supervision of employees made easier.

It will be noted that items 4, 5, 6, 7 and 8, have a bearing on accidental prevention.

In one of the sections of the explanatory notes, emphasis is placed on the wisdom of light colored interior finish, both in reinforcing the direct illumination and giving better diffusion, which in turn adds to the light received on the sides of a piece of work; and a complete section is devoted to the question of side light, that is, light on working surfaces other than the horizontal.

One of the sections of greatest value is that dealing with maintenance. It is believed that while its importance may not appeal to every user of light, a consideration of the points set forth will interest factory managers

It has been felt that the code should include reference to some features of eye protection, other than those related to proper lighting, and it is urged that attention be given to eye protection from such operations as electric welding. Reference is made to protective glasses, and to the fact that the glasses should not be judged by visual inspection, but on their spectral transmission of invisible radiations.

As a general policy, photographs are used to illustrate good and bad lighting, and the captions are so worded that the reader may detect the main points.

The question of ways and means for enforcing such a code has had considerable discussion. Many difficulties present themselves at first thought, because of the extreme variations in illumination intensity from natural light sources, such as windows, skylights, and the like, and because the conditions in the average factory are so widely variable. Conferences with the Commissioners of Labor in two States indicate that the enforcement of a code, though unquestionably difficult, is possible. Much depends upon the viewpoint of State departments, and if this is such as to encourage a study of the reasons back of the requirements, as well as the methods of accommodationg conditions to meet them, there is every reason to believe that improvements will replace much of the industrial lighting.

Code of Lighting.—Factories, Mills and Other Work Places.

Article I.—*Daylight.*—All buildings hereafter constructed must be provided with adequate window area. Awnings, window shades, diffusive or refractive glasses must be used for the purpose of improving daylight conditions, or for the avoidance of excessive brilliancy, wherever they are essential to these ends.

The windows, skylights, saw-tooth or other roof lighting constructions, are to be arranged with reasonably uniform bays, and the daylight openings shall be so designed and proportioned that at the darkest part of any work space, when normal exterior daylight conditions obtain, there shall be available at least a minimum intensity equal to three times the minimum intensities given in Article V. for artificial light.

The intensity requirements for daylight are higher than those for artificial light, because the physical condition of the eye during the daytime is usually such as to require a higher intensity of natural light for satisfactory vision than is required at night under ordinary well designed artificial lighting systems.

Article II.—Buildings not having adequate window area, must be provided with adequate artificial light, according to the following articles, so as to supplement the natural light during normal daylight hours.

ARTICLE III.—All buildings, whether old or hereafter constructed, must be provided during those hours of work when natural light is insufficient or not available, with adequate artificial light according to the following articles.

ARTICLE IV.—Adequate intensity of light must be provided for each class of work, both on a horizontal plane as well as on a vertical plane passing through the work, according to Article V. In all cases, however, glare on working surfaces is to be avoided as it tends to reduce the visual efficiency of the workmen and to increase the likelihood of accidents.

ARTICLE V.—*Artificial Light; Intensity Required.*—The average illumination intensity throughout any month, actually measurable in foot candles on a horizontal plane through the work, is to conform to the following table. Uncertain cases which arise as to how to classify given manufacturing operations are to be left to the judgment of a lighting expert.

Class of work	Minimum foot candle intensity	Desirable foot-candle intensity
Storage, passageways, stairways, and the like..	0.25	0.25 - 0.5
Rough manufacturing and other operations..	1.25	1.25 - 2.5
Fine manufacturing and other operations....	3.50	3.5 - 6.0
Special cases of fine work	—	10.0 -15.0

Where operations are performed on the sides of the work in hand, they shall be classified according to this table, and if the illumination is furnished from an overhead system, it shall preferably *be not less than 50%* of the foregoing values, when measured on a vertical surface. If the illumination is furnished by an individual lamp or by lamps close to the work, the intensity shall conform to the minimum or desirable intensities required in the foregoing table.

As a guide to inspectors and others, it may be stated that with modern lamps roughly 1 candle power per square foot produces an effective illumination of 3 foot candles when the lamps are arranged according to the uniformly distributed overhead system, with mounting heights ranging from 12 to 16' above the floor, and when the light is directed from said lamps to the work in an efficient manner. A rough idea may thus be secured of the candle power per square foot necessary to conform to the foregoing table of intensities by taking *one third of the intensity values given in the foregoing table.*

Thus for fine manufacturing and other operations, the minimum foot candle intensity is 3.5, which is approximately equal to 1.2 candle power per square foot. The use of a portable photometer or illuminometer, however, is recommended for the determination of existing systems and all uncertain cases are finally to be established by these instruments.

ARTICLE VI.—*Lamps and machinery* jointly, are to be so arranged as to avoid the casting of shadows over belts and other obstructions on important parts of the work, and the distribution of light from the lamps should be such as to avoid sharp contrasts of light and shade on the work.

ARTICLE VII.—*Inspection and regular maintenance* of all lighting systems is required in spaces where work is being conducted, and in no case must the lighting devices, whether windows, lamps or auxiliaries such as globes and reflectors, be allowed to deteriorate, due either to dirt accumulations or to burned out lamps, more than 20% below the minimum intensity values required by Article V.

ARTICLE VIII.—*Roadways, yards and places not usually frequented* must either be provided with illumination during working hours when natural light is absent or partly absent, to make them safe against accident to employees traversing or engaged in such places, or a convenient control or controls must be placed at the entrance to basements, stock rooms, and the like, so that a person on entering can readily turn on the lamps beforehand.

ARTICLE IX.—*Stairways and passageways* must be provided with lamps and reflectors or shades carefully located so as to shed their light generally over the entire space or spaces involved, and in sufficient quantity to make the stairways and passages safe against accident to employees traversing or engaged in such places. For intensities see Article V.

ARTICLE X.—Each working space is preferably to be illuminated by lamps mounted overhead according to the system of general lighting, in preference to individual lighting. The overhead method of lighting, besides possessing many other advantages, also tends to reduce dark spots throughout the floor area, a feature usually objectionable with the use of individual lamps. This particular Article is not an absolute requirement, but a suggestion enforceable at the discretion of a lighting expert.

ARTICLE XI.—*Auxiliary lighting* should be provided in all large work spaces, such lamps to be in operation simultaneously with the regular lighting system, so as to be available in case the latter should become temporarily deranged.

EXPLANATORY RULES.

The foregoing eleven articles are intended as the basis for legislation, and also to furnish a practical working guide for the installation of factory systems. As a further aid in the observance of the articles, appended rules present the more important features of such work from a slightly different angle, and hence form a useful supplement to the articles proper. These eight rules take the following form:

1. Lamps should be equipped with reflectors or shades for minimizing glare and economizing light. Bare lamps should not be used except in rare cases, and only when out of the line of vision.
2. As a general plan, mount the lamps high and out of the ordinary line of vision.
3. Although the types of reflectors and shades, and reflector and shade holders or fitters on the market are numerous, it is recommended that the holder or fitter, as well as the reflector or shade, be selected with reference to placing the light source at the proper point in the reflector or shade, so as to eliminate glare due to exposure of the light source, and also for the purpose of directing the light from the lamp effectively to the work, that is, for obtaining a distribution of light which meets the desired requirements.
4. Light thrown vertically downward is not the only important component of the resulting illumination. The sides of machinery, machine tools and work, as well as horizontal surfaces, often require good light.
5. Control few lamps in each group, so that lamps not needed may be turned off conveniently.
6. Keep windows, lamps and reflectors clean, since large losses of light result from the accumulation of dust and dirt.
7. Provide a maintenance department if the shop is large enough to warrant it, so that all the items associated with the upkeep of the lighting system may be cared for systematically.
8. Keep ceilings and upper portions of walls a light color for the purpose of rendering both natural and artificial lighting more efficient and better diffused. The lower portions of walls should be a color that is restful to the eyes, preferably a medium tint, typified by the tint known as *factory green*, or a rather dark shade of yellow. Other medium tones are also available.

EXPLANATORY NOTES.

Following these articles and the rules, the code contains 17 sections under the general title Explanatory Notes, which apply in amplified form to the items in the articles and rules. These Explanatory Notes are treated under the subheads of daylight; value of adequate illumination; old and new lamps; effects on factory and mill lighting produced by modern lamps; general requirements of artificial lighting; overhead and specific methods of artificial lighting; various locations illustrated; lighting circuits for electric lamps and supply mains for gas lamps; control of lamps and arrangements of switches; systematic procedure should be followed in changing a poor system to an improved arrangement; reflectors and their effect on efficiency; side light important in some factory and mill operations; maintenance; expert assistance suggested; other features of eye protection; auxiliary systems for safety; and good and bad lighting compared.

The New Platform of Modern Public Utility Corporations.

1. Accept loyally and without reservation the now universally proclaimed doctrine that a public utility is the servant of the people.
2. Give the affairs of the utility the widest publicity.
3. Treat your employees fairly and, as far as your resources will permit, generously.
4. Keep out of politics.
5. Appeal to the public for fairness and justice.

Deem it your right and duty to influence public opinion.

Complain of the wrongs that are done to you.

Expose the methods of corrupt or unfair politicians.

Combat the arguments of muckrakers and pseudo-reformers.

Never allow an untrue charge to remain unchallenged. Circularize the public. Buy space in the newspapers. Participate in public discussions. But above all remember that whenever you do anything along these lines you must do it openly and in the name of the company.—The "Gateway."

Creating an Atmosphere.

By W. B. STODDARD.

Four Widely Separated Window Displays.

Goods in appropriate surroundings sell more readily than when cast helter skelter into the window, or displayed promiscuously on the counter. By showing stoves, lamps, lighting fixtures in rooms where they are actually used, and demonstrating in a practical manner how much they add to the beauty or comfort of the home surroundings, you make a deeper impression upon the housewife and her good man than by any other method of advertising.

A few concrete examples will explain more definitely what I mean. The Mobile Gas Company, Mobile, Ala., recently installed a window that appealed at once to every mother. A section of a nursery was fitted up, with a gas grate on one side. On a big fur rug before it was a chubby youngster of two, in white dress, his arms about the neck of a papier mache dog (which bore a striking resemblance to the one made famous by the Victor talking machine). A delapidated doll, and a little horse on wheels close by, gave a very natural finishing touch to the picture, while a card said, "Warm Friends." Another card advised:

Nothing is so Precious as the Health of the Baby
Keep the room at an even temperature by a
GAS HEATER
It will prove a WARM FRIEND to Baby and Mother

Graham & Collins, San Antonio, Texas, showed the practical value of the gas heater in another capacity. Here was a bathroom in white porcelain, with Sanitas walls and alarge bath rug on the floor. The object of supreme importance, however, was the portable gas heater in one corner. Seated in the tub was the large cut figure of a smiling youngster (a wax figure would have been even more effective, as more closely simulating life). The heater was enameled white, making it in perfect keeping with the other outfittings of the room. An artistically lettered sign suggests:

JUST THE THING FOR A CHILLY MORNING
Athletes and robust folk may scorn the warmth
but baby must be protected, and invalids shun the cold.
A GAS HEATER
keeps the room at just the right temperature and makes
the daily bath a delight.

Here, too, was driven home the advantages of the indirect lighting system, as the room was lighted from above, a large shade of ground glass preventing the rays of light from striking the eyes, while a pleasant light was diffused throughout the room.

A very catchy window was exhibited by the Public Service Gas Co., Newark, N. J., and one that would be especially effective for those who are thinking of giving something substantial to the bride of next June. Practical gifts are becoming more and more the custom, and nothing could be better for a collective gift of employes of office or factory, or for parents or near relatives, than a gas range. Attention is called to the range as a suitable gift by the novel setting of the window. The floor was covered with red velvet, and upon this was set a great box 5' square and deep. This was lined with red, and covered on the outside with black and white striped paper. At one side, as though just taken off, was the cover, also of black and white striped paper, across which was a broad band of red satin ribbon, tied in a great bow. The whole presented the appearance of a gift box of flowers or bon bons. Within the box, with sufficient space all around so that it could be seen to advantage, was the latest model gas range. A card in front announced: "A Nifty Gift for the Spring Bride."

In Salt Lake City the Utah Gas and Coke Co., appeals to every citizen, man and woman, in the broadest sense of civic pride. The upper part of their window is painted red, and on this in letters of white are the words:

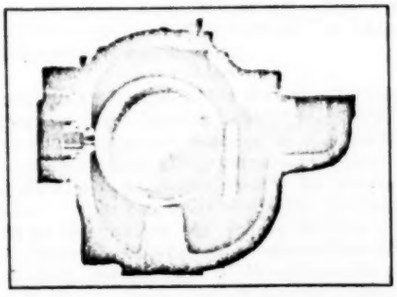
MAKE FOR A CLEAN CITY.
Use Smokeless Fuel. Gas for Cooking and Lighting.
GAS STOPS SMOKE.
The Cheapest Kitchen Help is Gas.

A card in the corner of the window says: "Demonstration of preserving on a gas stove every afternoon. You are welcome." Right up against the window is an enamel table on which are the materials for preserving, and close at hand a gas range. The demonstrator works in the window, so that every motion can be plainly seen from the outside by the crowds. On the inside, facing the window, are a score of chairs, so that some more interested can watch the process at their leisure. The demonstrator herself, in white cap and apron, is the best advertisement of gas as a fuel, as her face is not flushed and bears no telltale marks of soot such as would be sure to appear were coal or wood used.

The window that tells the story is the one that sells the goods, and the sooner companies learn to get the customers' point of view, the better it will be for their business.

New Methods and Appliances.

A SIMPLE STEAM TRAP THAT HANDLES HIGH RATES OF DISCHARGE.—The steam trap illustrated was designed by Charles S. Brown, professor of mechanical engineering at Vanderbilt University, Nashville, Tenn., for use on a large oil separator on the exhaust line leading from the university power plant to a vacuum heating system. The original device consisted of a 5" copper ball float operating on a discharge nozzle containing a 3/8" orifice, and has been in successful operation for seven years.



This type of steam trap is now made for apparatus where the rate of discharge of condensate is very high, as well as on heating system lines and the like. Mechanically it is equivalent to the ordinary float trap, with its lever, fulcrum and valve. The float is the valve, its radius being the lever at the end of which the force produced by the buoyancy of the float may be considered as concentrated. The fulcrum is the upper edge of the orifice over which the float rolls. The valve proper is that portion of the float covering the orifice, and its lever arm is the orifice radius.

The device operates against heavy pressure even with floats of small size and orifices relatively large.

In this type of rolling float trap a proper proportioning of the face of the nozzle containing the discharge orifice makes it possible to discharge air automatically through the orifice even when the operating water lever is considerably above the orifice. The trap is self-adjusting because the hollow spherical ball naturally seeks the point of least pressure, which is the orifice. It is relatively powerful even in very small sizes because of its position with respect to its discharge orifice. The action of the hollow float on the plain surface of the dicharge nozzle is a rolling one, and therefore practically frictionless. Its simple design makes it a durable piece of apparatus.

STORING NATURAL GAS UNDERGROUND. "The Standard Oil Bulletin" reports the use of an abandoned gas well for storing the excess gas from other wells. This surplus gas under well pressure is piped to the old drilling and discharged into the earth, where it is supposed it will be stored in the emptied underground reservoirs. These old gas pockets are thought to still have enough gas in them to have kept out the air. It is thought that almost unlimited quantities of gas can be thus forced underground, and stored until required for use, as the continued pumping in merely means that other emptied pockets will be filled. This is reported from the Midway California field, on what is known as the Derby Lease.

Items of Interest from Various Localities.

THE commercial department of the Citizens Gas and Fuel Company, Terre Haute, Ind., participated in a cooking demonstration during the week beginning January 25, staged by the Terre Haute Star and the manufacturers of "Crisco." The company loaned two large gas ranges, and in the lectures on modern cooking the demonstrator naturally demonstrated the efficiency of the gas range and described its operation. This was the most profitable demonstration the company has ever taken part in, and it did not cost a dollar. The gas ranges used were sold by the demonstrator during the week, and a number of other range sales were directly traced to the publicity gained in this way. They had a 100% increase in range sales during the month of January over the same month last year, and 71% increase in house piping contracts.

MR. J. F. OWENS, superintendent of the Muskogee Gas and Electric Company, Muskogee, Okla., was elected vice-president of the Arkansas River Improvement Association, at a meeting on March 2.

A COMPANY organized by A. W. Borden, manager of the Hastings (Neb.) Gas Company, has purchased and will operate the Central City Gas Co. It is planned to put the plant in condition to give the people of Central City first-class service. Mr. Borden will plan the remodeling of the plant and will direct the management. Mr. Borden is also interested in the Grand Island gas plant which is now giving excellent service to the people of that city.

THE Duluth, Minn., municipal water and gas plants are worth $3,769,080.23, according to E. W. Kelley, chief engineer of the department. According to his figures, the cost to reproduce the plants new would be $4,250,916.42. The difference between this figure and the present value representing deterioration. The water plant properties are valued at $2,413,598.97, and the gas plant $1,005,846.17. Undistributed properties, which include equipment used by both plants, are valued at $249,635.09. The statistics show that there are 763,714 feet of water mains and 682,831 feet of gas mains in the city. On Aug. 1, 1898, the city took over the water and gas plants, paying $1,250,000 therefor.

MR. A. P. LATHROP, President of the American Light and Traction Company, the corporation controlling the San Antonio Gas and Electric Company and the San Antonio Traction Company, announces that another new gas holder will be erected in San Antonio early next year, besides the other improvements made necessary by increased business. When the gas plant was removed from West Houston street to its present site, 10 years ago, it was thought preparation had been made to meet the needs of San Antonio for a long time, but the development of the city since than has made it necessary for the plant to run to full capacity.

THE Cape May (N. J.) Light and Power Company, which supplies electrical energy in Cape May and vicinity, has been taken over by the National Gas, Electric Light and Power Company, the parent company of the local gas company, the Cape May Illuminating Company. In general, the members of the operating departments of both companies have been retained, but the office forces have been consolidated, and on March 15th moved to a splendidly equipped office and sales room on the most prominent corner in the business district. Mr. E. G. Jones, who has administered to the affairs of the Cape May Illuminating Company for the past 5 years, has been retained as Superintendent of the consolidated properties.

RESIDENTS of Douglas and Douglas Manor, L. I., must get along without gas, as the result of a decision of the Appellate Division reversing an order of the Public Service Commission, granting an application by the residents of the two villages to compel the New York and Queens Gas Company to extend its mains from Bayside. The Appellate Division's opinion, reversing the commission, states that east of Bayside a marsh and navigable creek extend for more than a mile, and to reach Douglas Manor and Douglaston the mains would have to cross this marsh. The two towns have about 230 houses, and are now supplied with electric light. They are not piped for gas, indicating that the builders did not expect that gas could be obtained. The Court says that gas is needed there only for cooking and possibly for heating in the summer months, and that if it was also needed for illumination a different question would be presented.

THROUGH an arrangement between the Lansing (Mich.) Fuel and Gas Company, and the Reo Motor Company, gas will be substituted for gasoline in the block engine test of the latter company. The proposition means a saving of 40% of the block test cost of the Motor Company and the use of approximately 10,000,000 cubic feet of gas per month. About $15,000 will be spent between now and May 1 in new plant equipment and mains, including 2,000' of 12" main running to the factory. Fifteen of the engines blocks have already been connected up for gas tests, the factory mains not accommodating a larger number. "If 5,000 homes should be piped for gas to-morrow, their daily consumption would but equal the amount that will now be used by the Reo," says Manager Graves of the Lansing Fuel and Gas Company.

SANTOS DUMONT, the noted Brazilian aeronaut, may make a balloon flight from Pittsfield (Mass.) this summer. Leo Stevens, the New York aeronaut, has written Manager H. C. Crafts of the Pittsfield Coal Gas Company regarding the gas supply for the flight. He proposes to race Santos Dumont. Alan R. L. Hawley is to be judge. Mr. Stevens also suggests the possibility of a contest for the long distance cup offered by Cortland Field Bishop. Mr. Crafts gave a favorable reply to the communication.

THE chief engineer of the city of Baltimore has started a gas inspection trip to make an investigation into the quality, quantity, utility and price of natural gas and submit his findings to the Board of Estimates. His instructions from the Board are to visit cities where natural gas is used and also the gas fields of West Virginia. He will inspect manufacturing plants which use natural gas, and also inquire into the household use of the fuel. The Board of Estimates wants to know all about the gas before acting on the proposition from the Columbia Gas and Electric Company, which is seeking a narural gas franchise in Baltimore.

THE Pacific Gas and Electric Company is making extensive improvements at its plant in Santa Rosa, Cal. The company is spending considerable money and has several aims in view in the work. First comes the greater efficiency of the plant, next, better conditions for the men, and third, the matter of improving the general appearance of the property.

PRESIDENT EDGAR P. SAWYER of the Oshkosh (Wis.) Gas Light Company, has presented to the city of Oshkosh a tract of two acres of land in West Algoma, for park purposes, as a memorial to his wife. The property is to be used for a public recreation center, and is to be known as the Mary Jewel Park, in honor of Mrs. Sawyer.

LABORERS excavating in Canal street, Chicago, opposite the Northwestern Passenger Terminal, recently unearthed a two-foot piece of wooden gas pipe that had been buried since 1850. It will be presented to the Chicago Historical Society by the Northwestern Railway as an addition to its collection of local antiques. It is thought that it is part of the special main laid from the original gas works at Monroe and Market streets to the first station of the old Galena and Chicago Union Railroad. This main was constructed at a great expense to illuminate the station and 7 lamp posts that were maintained by the gas company at a cost of $15 a month. It was buried thirty-two feet below the present street level.

THE third annual entertainment and dance of the Flatbush (Brooklyn, N. Y.) Gas Company Employees' Association, was held at the Cortelyou Club, Bedford Avenue and Avenue D, on March 4th. Over 500 attended. James A. Kenny is president and Herbert J. Roginson was chairman of the entertainment committee. Two one-act comedy playlets were presented. "Wanted, a Male Cook," a comedy farce, in which Elmer E. Glanz, Jr., a French cook, scored a hit; as did also "The Great Elixir," with John L. Blanchard as a doctor.

AT the meeting of the stockholders of the Providence (R. I.) Gas Company, the followingg were re-elected to the board of directors: Newton D. Arnold, John W. Ellis, Henry D. Sharpe, John R. Freeman, Webster Knight, Frank W. Matteson, William. L. Hodgman, John B. Branch and Charles H. Manchester. At the meeting of the

directors these officers were re-elected: President and manager, John W. Ellis; vice-president and treasurer, Charles M. Manchester; secretary and assistant treasurer, Arthur F. Short. The report showed an increase of 33,890,000 cubic feet of gas sold during 1915 over the amount sold during the previous year.

DONALD C. PLANK, who had resigned as manager of the Missoula (Mont.) Gas Company, will serve for another year, and C. R. Young, a well-known gas man of Billings, will assume charge of the new business department according to an official announcement by the directors. The announcement says: "Feeling that for the best interests of the Gas Company the present management should be retained, Mr. Plank has been prevailed upon to reconsider his resignation. E. C. Collier also will be retained and C. R. Young of Billings has been engaged to handle the new business department. His coming is a step toward a more liberal policy of the company, further announcement of which will be made later."

A Fort Madison, Ia., newspaper says; The removal of the plant of the Fort Madison Gas Light Company to a more central location in the city, is one of the matters that will be brought before the heads of the corporation controlling the local company, by Manager J. G. Moffatt. The present location of the plant, at the extreme east limits of the city, has caused no little inconvenience in maintenance of sufficient pressure to all parts of the city. With the steady industrial expansion and growth in the West End that inconvenience would become more evident. It is thought that sufficient mileage of mains are now in place in the East End of the city to serve that section for all time. It is in the West End that extensions will have to be made as years progress. Another point considered is that the present plant through an extensive growth in the city will soon become inadequate, and it is planned to enlarge its capacity materially.

EMPLOYEES of the Rockford (Ills.) Gas Light and Coke Company held a meeting in the office of the company recently, and formed a social club. The following departmental managers will act as officers of the club until permanent officers are selected: E. Kliene, L. Stocking, C. Weedman, H. McArthur, W. Dewey and W. Sanders.

LOYALTY and co-operation among the employes and between the employees and their employers is accountable for the success of the Wilmington (Del.) Gas Company, as was demonstrated when practically the entire office force, numbering about 80, enjoyed a banquet and had a jolly good social time at the company's office on March 7th. H. S. Schutt, general manager of the C. H. Geist Co.; William J. Mc Corkindale, general manager of the Wilmington Gas Co.; W. A. Morris, manager of the commercial department, former Mayor Harrison W. Howell and Harrison Cruikshank were guests. The banquet was the result of happy circumstances, chief among which was the celebration by the commercial department of a particularly gratifying business result during the past few months, while the Gas Study Club and other departments co-operated to make the celebration general. William P. McCracken proved an admirable toastmaster. Mr. Schutt complimented the employees upon their efficiency and loyalty. Mr. McCorkindale told of the success of the business, which he said was due mainly to efficient service rendered by employees. Mr. Morris said his department admitted that much of the success was due to the splendid work of the other departments. Several musical numbers were provided by the Temple Male Quartette and employees of the company, who also favored with clog dancing and other forms of entertainment.

DETROIT, Mich., is experiencing the greatest shortage of coke in its history, according to V. F. Dewey, vice-president and general manager of the Detroit City Gas Company. Many retail dealers have been caught with short supplies and domestic consumers have trouble in getting orders filled. The company, at one time this winter, was 250 cars behind in orders, and recently refused an order for 300 tons from Ypsilanti because it had barely enough coke to supply regular domestic consumers. The price of coke to industrial consumers has been advanced several times this winter, but no increase is contemplated to household users.

NEWMAN, CAL., is to have a gas plant, if an application now on file with the Railroad Commission is granted. As president of the Newman Gas Company, C. S. S. Forney has filed an application for a certificate of public convenience and necessity. The application was backed by a petition signed by about 200 prospective customers.

Utilities Commission News.

AUTHORITY OVER ALL CONTRACTS.—The Pennsylvania Public Service Commission has decided that where a public service company was chartered prior to the enactment of the law creating the commission, the latter body has in the exercise of its police power, the authority to restrain the company from making a contract for lighting the streets of the municipality covered by its charter after the contract has been approved by the municipality. The decision was given in the action between the township of Jenkins and the Jenkins Township Electric Light, Heat and Power Company. However, the disapproval of the contract in no way impairs any of the charter rights of the corporation, the contract being disapproved because there was already an electric lighting company doing business in the town, while the company under consideration was not engaged in supplying electrical energy. The commission, therefore, would not permit what it termed "a ruinous competition" to be established in a municipality.

AMENDMENTS IN POLITICS.—It is suggested that the candidates seeking election to the Indiana Legislature be asked to state how they stand on the proposed changes in the public service law designed to prevent public utility corporations from over-capitalizing. Each candidate, it is suggested, should be asked to answer these two question: "Do you favor amending the public service law in such a way as will require the Public Service Commission to appraise the physical properties of a corporation before authorizing an issue of stock and bonds?" "Would you favor an amendment, and do all in your power to have it enacted, empowering the Public Service Commission to declare a corporation insolvent if it is found that its outstanding liabilities exceed the value of its physical and tangible properties necessary to supply the utility it may be serving?"

NEW YORK COMMISSION EXPENSES.—The expenses of the Public Service Commission for the Second District of New York during the first year were $438,000. For the current fiscal year (ended September 30, 1916) the appropriation is $394,000, and for the next fiscal year the commission has requested only $392,000, showing a consistent decrease in cost despite enlarging duties. There are now 928 public utility enterprises under the jurisdiction of the commission, including steam and street railway corporations, express, sleeping car, baggage and baggage transfer, stagecoach and stockyard companies, electrical, gas, steam corporations, telephone and telegraph companies.

DECIDES FOR COMPETANT APPLICANT.—Called upon to determine which of two petitioners for a certificate of convenience and necessity should be authorized to install a gas plant in Idaho Falls, the Public Utilities Commission of Idaho has decided in favor of Wm. D. Wilcox, representing Chicago capital, as against J. A. Jones. The latter applicant filed application first, but failed to present a definite plan. "We are met at the threshold," says the commission, "with the proposition as to what weight should be given the the application of Jones, by reason of his priority alone. If all other conditions and facts surrounding the two applications were equal, than the preference should be given to the party first making proper application therefor. The policy of this commission is now, and has been since its establisment, that public utilities of this character should have a monopoly of the field so long as they give adequate service at reasonable rates. In fact, we feel confident that neither of these applicants would desire a certificate if he felt that the right were going to be granted to both. * * * The controlling factor in a controversy of this kind is the public convenience and welfare. Making a concrete application of that rule to the present proceeding, the question naturally arises: Which of these applicants will be able to render the best service to the public?" Mr. Wilcox is to have till June to commence work, and until October, 1917, to complete the installation.

Financial Notes.

A HANDSOME booklet, showing 40 photographs of the properties operated by the NORTHERN STATES POWER COMPANY in Minnesota, North and South Dakota, Illinois and Wisconsin, has been issued by H. H. Byllesby & Co., managers and engineers. The remarkable progress of the 10 operating units, which more than doubled their business in four years, is shown in detal, and information relative to the company's physical property is given in a concise form. The booklet, which bears the title "Back of the Investment," visualizes for the investor the 10 water powers, 13 modern steam plants, 5 gas works and other property, now serving upwards of 100 municipalities with a population of about 800,000, including the cities of Minneapolis and St. Paul. The number of customers served by this organization advanced from 48,366 in 1912 to 80,710 at the end of 1915, an increase of 67% in 3 years. Most of the important physical properties are either new or recently rebuilt. Not the least interesting page in the booklet is that headed "Partnership with Citizens," and reading as follows:

"*Northern States Power Company* encourages investment in its securities by the people of the communities served, for the following principal reasons:

"1. To make the public and the utility company actual financial partners, as well as partners in community advancement.

"2. As a sound investment for the capital and savings of citzens.

"3. As a step in the further popularization of the organization.

"4. Towards the distribution of profits among consumers.

"5. To assist in obtaining at lowest cost, any part of the funds for construction purposes which it may be necessary to secure in the general investment markets of the country from time to time.

"*The partial payment feature is offered* to enable the wage-earner and small salaried man to acquire stock in the company. The investor may subscribe to a limit of ten shares, paying for them at the rate of $5 a share per month. The investment earns 6% interest during the payment period.

"The 7% preferred stock of the Northern States Power Company has paid dividends regularly since organization in 1909. It may be purchased for cash or on partial payments at the office of any operating unit."

ON its $55,503,950 of capital stock, the UNITED GAS IMPROVEMENT COMPANY last year earned 14.40%, as compared with 14.22% in the previous year. Earnings from regular sources amounted to $7,481,389, an increase of $929,658 over the preceeding year, and to this was added $1,230,000, representing an extra dividend on stock of a company in which the United Gas Improvement Company is a shareholder, an item which did not appear in 1914, making total earnings of $9,071,389, a decrease of $13,153. The decrease is explained by the fact that the company in 1914 made a profit of $2,172,812 from the sale of securities. Net profits last year, after payment of expenses and taxes, totaled $7,996,920, an increase of $100,520. After deduction of regular dividends, requiring $4,440,236, and sinking funds amounting to $797,500, the balance carried to undivided profit account was $2,759,184, an increase of $104,320 over the previous year. This makes the total surplus of the company at the end of the year $32,622,149. The directors, at their meeting, declared the regular quarterly dividend of $1 per share, but took no other action. This would seem to dispose of any idea that the company plans to make a stock allotment or a stock dividend. The annual meeting is scheduled for the first Monday in May, and if an additional stock issue was in contemplation, 60 days' notice would have to be given to the stockholders.

THE gross income of the ELECTRIC BOND AND SHARE COMPANY, for the year ended December 31, 1915, was $1,820,337 and the net income $1,401,085. During the year $344,647 was paid out in dividends on preferred stock and $433,788 on common stock. The surplus income for the year was $622,660. There was on hand and in banks on December 31, 1915, cash amounting to $2,066,209. There were accounts receivable to the amount of $476,206, notes receivable, $282,995, and accrued interest receivable $90,607, making a total of $2,916,018 of current assets. Against this are current liabilities of but $62,760, divided into $2,760 for accounts payable and $60,000 for the preferred stock dividend of February 1. The total surplus as of December 31, 1915, was $4,244,566, which was larger than that of a year previous by $1,048,869.

PACIFIC GAS AND ELECTRIC COMPANY changed out of earnings as operating expenses for depreciation $100,000 per month for the first six months of 1915. For the last six months they charged $130,000 per month or an average for the year of $115,000. For January, 1916, their statement shows this item increased to $125,000 per month. In spite of this, the surplus earnings available for the dividend on common stock in January show an increase of $83,510. The statement for the month follows:

Gross oper. revenue	$1,762,713	$91,928
Total expenses	975,718	76,611
Net earn. from oper.	786,995	15,316
Miscellaneous income	87,219	63,693
Total net income	874,214	79,010
Interest	331,876	21,772
Balance	542,338	100,783
Bond discount	14,431	30
Surplus	527,907	100,752
First pfd. dividends	60,668	17,241
Original pfd. dividends	50,000	.....
Surplus (unapprop)	417,238	83,510

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